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OFFICE NOTE 100

(RE-REVISED)

Format Requirements For
Alphanumeric Bulletin Transmissions
and
How to Send Them Out

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PURPOSE

This Office Note describes the format to be used in constructing alphanumeric bulletins on the NOAA Central Computer Facility (NCCF) computers for eventual transmission by the NWS Telecommunications Gateway (NWSTG) system. (The preparation of binary bulletins, such as GRIB and BUFR, is described in NMC Office Note 295.)

The format of these bulletins generally follow international agreements made under the auspices of the World Meteorological Organization (WMO).

Alphanumeric bulletins are text messages with special WMO-style headers that control their routing. They also contain special characters that control their format and transmission. Internally, as prepared on the computers at the NCCF, they are composed in the Extended Binary-Coded-Decimal Interchange Code (EBCDIC); when transmitted, they may be in other codes such as American Standard Code for Information Interchange (ASCII) or even Baudot. The translation from EBCDIC to ASCII (or other code forms) is handled by processing codes on the NWSTG machine.

Bulletins may be transmitted over any or all of a number of low and high speed communication lines. Alternately, bulletins may not be transmitted at all, but sent to special "bins" within the disk storage of the NWS Gateway computers for examination using time-sharing terminals or other purposes.

The NWSTG, per national and international agreements, routes bulletins according to the eleven character WMO bulletin header. The first six characters identify the bulletin type; the remaining four, after a blank, identify the originating station. For example:

FOUS22 KWBC

is a max/min temperature and precipitation forecast for the United States, originating at KWBC (NMC). The official interpretation of the heading may be found in WMO Publication No. 386: Manual on the Global Telecommunications System, and the various "originating stations" are listed in "Location Indicators", Doc 7910, published by the International Civil Aviation Organization (ICAO). (Nobody ever said it was simple.)

CONVENTIONS

In what follows, character strings surrounded by double quotes in the form "ABC" represent literal values. A construction in the form <XYZ> represents a single control

character; those control characters used in the transmission process are listed in a "Table of Special Characters" at the end of this note, as are a collection of other special characters. Underlined lower-case strings xxxxxx are variable quantities.

CHARACTER TRANSLATION

The "special characters" referred to above are not the same as the EBCDIC or ASCII characters with the same name. For example, in EBCDIC a <SOH> or Start-Of-Header character is hexadecimal 01. However, hexadecimal 01 is not a printable character or even directly viewable on most equipment. Long ago, in an attempt to make debugging simpler, printable and (at the time) unused characters were substituted. Thus within EBCDIC bulletins a single quote ''' or hexadecimal 7D is used to represent a <SOH>. (This has the practical effect of prohibiting transmission of single quotes as such, but in ancient times transmission of such things was not envisioned.) The software in the NWSTG performs the proper translation of these characters to their EBCDIC or ASCII equivalents before they are transmitted. See the "Table of Special Characters" below.

The following characters may be used as such: (That is, they do not get converted into other characters.)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789
. &) - / , # = "
space

The following characters become control characters:

< becomes <CR>, Carriage Return.
\$ becomes <RS>, Record Separator.
^ becomes , DElete.
% becomes <ETX>, End of TeXt.
> becomes <ETB>, End of Transmission Block.
@ becomes <LF>, Line Feed.
' becomes <SOH>, Start Of Header.
\ becomes <BEL>, BELl or audible alarm.

The following characters undergo startling transformations:

+ becomes -
| (hex:4F) becomes +
; becomes = or the "scattered" symbol on weather Teletypes
_ becomes ^
{ becomes ?
} becomes !

Some EBCDIC characters without conventional representations also undergo unexpected transformations:

Hex 62 becomes \
63 becomes] (hex:5D)
64 becomes @
65 becomes <HT>, Horizontal Tab.
66 becomes <VT>, Vertical Tab.
67 becomes \$
68 becomes {
69 becomes }
6A becomes | (hex:7C)

You can insert a character, hexadecimal 5F, anywhere in the message. It will be deleted and the adjacent characters will be pushed together to eliminate the space.

CREATING A BULLETIN

The first thing you have to do is construct the actual meteorological bulletin. There are many WMO authorized formats for such, and new ones are constructed from time to time for special purposes. Essentially, you work out a mutually satisfactory arrangement with the potential recipients, within various constraints mentioned below, and that's it. You can seek WMO approval of your new code form if you wish, and you must do so for any international transmissions, but there are plenty of local or national forms in use as well. But what must be unique is the bulletin header which both determines where the bulletin is to be sent and identifies the content, at least to some extent. All bulletin names are assigned through the NWS Office of Systems Operations, Graphics and Display Section, W/OSO242. All new bulletins must be coordinated with that office.

Bulletins should not exceed 2000 characters in length if they are to be generally distributed, owing to the limitations of message switching equipment. Generally, long messages should be rethought or broken into individual bulletins. This is only a guideline; if longer messages are absolutely essential that's O.K., but check with the OSO Communications folks about hardware or software limitations.

Bulletins intended to be printed consist of one or more lines separated by a <CR><CR><LF> sequence, conventionally "<<@". Because of teleprinter limitations, each line should be limited to 69 data characters.

If bulletin are being prepared for low speed distribution (Baudot circuits), they must not contain any special start or end character sequences such as "ZCZC" or "NNNN". Again, check with

the communications folks about whether this restriction applies in you particular case.

The first thing in the bulletin proper is the WMO abbreviated heading, which consists of the bulletin name, the originator, and date/time groups, all separated by blanks:

Characters	Contents
1-7	Bulletin name assigned by OSO, usually 6 characters such as "FOUS22", followed by a blank.
8-12	ICAO identification of originating station, in our case "KWBC", which stands for the NWS. A blank follows.
13-18	Date/time in form <u>dd</u> <u>hhhh</u> where <u>dd</u> is the day of the month, ranging from "01" to "31", and <u>hhhh</u> is the hour and minute in a 24-hour clock in Universal Time (Greenwich Mean Time, Z time, etc.) <u>hhhh</u> ranges from "0000" to "2359". This date/time is generally the time of the observations in the bulletin, or the initial time of the forecast, or simply the time the bulletin was constructed, as appropriate.
19-21	<CR><CR><LF>, represented by "<<@". (See Table of Special Characters). Two carriage returns, <CR>, are always used in succession to allow electromechanical devices sufficient time to return the print mechanism to the left of the page.

Following the WMO bulletin header comes the text of the message. If the text data consists of individual reports, each report is followed by a scattered symbol and an end-of-line group. This is represented by ";" followed by <CR><CR><LF>. (A little history: The scattered symbol, originally a circle with a vertical bar through it, became a report separator after it was no longer needed for hourly observation reports. In the old Baudot code for Teletype Service A, the scattered symbol had the same code as the semicolon.)

The end of each bulletin is indicated by an <ETX> or End of Text character, hexadecimal 6C, conventionally a "%".

PREFIXING the bulletin for the Gateway

Once the bulletin is completed it is necessary to prefix it with a 40-character communications prefix. This prefix contains information, and blank space, that is used by the NWSTG people in making the bulletin ready for transmission. When the bulletin is eventually transmitted the communications prefix will have been stripped off.

The format of the 40-character prefix is:

Characters	Contents
1	<SOH> (Start of Header) character, hex 7D, conventionally a single quote "'".
2	Transmission priority. Set it to "1" always.
3-7	Catalog number. Most bulletins now are assigned catalog number "00000", but OSO may direct otherwise.
8	Contains a "B" if this is a backup FD or DF Wind Transmission. Otherwise unused - set to blank.
9-10	If the previous byte contains a "B", set these two to "FD" or "DF" to indicate which type of backup this is. Otherwise unused - set to blanks.
11	unused - set to blank.
12	Data type, as follows: Hex 00 = EBCDIC data 0B = Binary data 0C = Pseudo-ASCII data 03 = ASCII data (Here, we consider only type 00, EBCDIC data)
13-18	If the bulletin requires regional addressing for AFOS, address flags are placed in these bytes, thus: "E" - Eastern Region "C" - Central Region "W" - Western Region "S" - Southern Region "A" - Atlantic Region "P" - Pacific Region

A blank must follow the last flag given, or a blank must be placed in character 19 if all 6 address characters are used.

19-39 Unused, except 19 must be a blank if all 6 AFOS
 address flags were used above.

40 Must be a blank.

Do not be discouraged by the prospect of constructing this 40-character prefix - The NMC W3LIB subroutine W3FI61 will build it for you. See the DOCBLOCK in the code for further directions.

HOW TO PASS THE BULLETINS TO THE NWSTG COMMUNICATORS

Unfortunately even though you have constructed your bulletin, or set of bulletins, each complete with its own 40-character communication prefix, in memory, you still have to accommodate the communications people in the way you write your bulletins to a disk file for them to pick up.

1) Each bulletin must be written as one or more records of length 1280 bytes. These records may be blocked for I/O efficiency. If your bulletin is less than 1280 bytes (or any continuation record is only partially used) the remainder of the last 1280-byte record, after the terminating <ETX>, should be set, for readability, to binary zeros, to blanks, or to the character. Leaving the previous contents of the array in the record is trashy and in very bad taste.

The next bulletin, in a sequence of more than one, should be written starting in a new physical record; the NWSTG processing programs will skip from the <ETX> to the next record to look for a new 40-character communications prefix and the following bulletin. This will continue until an end-of-file on the data set is encountered.

Once a bulletin (or set of bulletins) has been created they can be placed in sequence in an array NBULL such that each bulletin (with its 40-character prefix) starts at location NBULL(1,M). M will take on various values depending upon how many 1280 byte records each bulletin requires. This code fragment will do the actual writing and blocking for you:

```
                 DIMENSION NBULL(320,NNN)
                 .
                 .
                 WRITE (fmt,unit) (NBULL(1,N), N=1,NN)
fmt        FORMAT(2(160A4))

//FTunitF001    DD DSN=yourdataset,DISP=(NEW,KEEP),
                 UNIT=3380,VOL=SER=NMCSW2,
                 SPACE=(CYL,3),
                 DCB=(RECFM=FB,LRECL=1280,BLKSIZE=12800)
```

NBULL should be dimensioned large enough to hold all the bulletins. NN is the count of all the records actually needed for all the bulletins. In the DD card, the DSN ("yourdataset") should be selected in consultation with the Automation Division, Production Management Branch (W/NMC42) as certain names have operational consequences; the "SPACE=" parameter should be set to a generous over-estimate of the necessary space (the file will be deleted automatically after your bulletins are sent on their way); the DCB parameter takes care of the actual blocking on the output device. Each new bulletin must start in a new physical record.

2) After all the bulletins are written to the output data set on the NMCSW2 disk, the data set must be closed. You can use a FORTRAN REWIND statement or, in VS FORTRAN, a CLOSE statement. This important step is necessary to release the data set from the control of the application program, which may continue to operate long after the bulletin has been created.

3) After the data set is closed you have to notify the NWSTG system that the message(s) are ready on NMCSW2. What you do is call subroutine W3AG15 with the characters "TRAN" in the second argument of the call sequence. See the DOCBLOCK for subroutine W3AG15 for more details on that process.

And that's it - your bulletins are on their way.

CHECKOUT

All of the above assumes that your code is working properly; unless you are some kind of superbeing, it won't be for the first few times. During your initial checkout efforts please do not write anything on VOL=SER=NMCSW2, but use a disk pack of your own, or a temporary data set (DSN=##TEMP), with DISP=(NEW,PASS). In checkout runs, W3AG15 will sense that you are not running an operational code and not send spurious notifications to the NWSTG machines.

You can print your bulletin with its 40 character prefix on any printer attached to the NCCF system or list it on TSO. A one-line JCL procedure NWSTXPRT developed by Russ Jones is useful. It is documented in data set 'NMC.PROD.PROCMEMO' and lives in data set 'MUSER.PROCLIB'. NWSTXPRT will print the bulletins in the form they would take on a teleprinter.

Once you are satisfied that your bulletins are properly constructed, you can make a final end-to-end test by changing the first 11 characters of the WMO header to "CHEK12 OUTT", sending the output to the NWSTG as indicated above, and using a "production-style" job name for your test. A production job name is one with a numeric character in positions 3 and 8 of the

JOBNAME (e.g., WW2JDSX1). The special WMO header will cause your bulletin to be routed to a local communications line attached to the Teletype printer located in the Senior Duty Meteorologist's area, Monitoring and Aviation Branch, 4th floor, World Weather Building. Your bulletin will print there within minutes of the time you submit your job if all is going well. Please alert the SDM that a test is under way before running your job.

An alternative is to use another special header "CHEK24 OUTT". This will cause your bulletin to travel all the way through the NWSTG machines, leaving a normal audit trail, but, in the end, go nowhere and not be printed. Contact the communications people (Al Mongeon is a good one to start with) within a couple of hours after your test run and have him check that your bulletin did indeed arrive and go where it was supposed to go.

Don't forget to restore the WMO header to its proper form before submitting your job for operational implementation.

TABLE OF SPECIAL CHARACTERS

EBCDIC Symbol	Graphic	Hex Code	Usage in Transmitted Bulletin
<CR>	<	4C	Carriage Return (always use in pairs). Print head returns to left side.
<LF>	@	7C	Line Feed. Paper advances one line.
<SOH>	'	7D	Start Of Header. Marks beginning of 40-character prefix.
<RS>	\$	5B	Record Separator. This is a fossil.
<ETX>	%	6C	End of TeXt. Marks the end of a bulletin within a data set.
<ETB>	>	6E	End of Transmit Block The remainder of the current physical record is skipped.
	-	5F	Filler character. Will be ignored and compressed out.
<BEL>	\	E0	Bell.
Minus	-	60	Minus sign.
Alt. minus	+	4E	Alternate minus sign. Will be converted to a -.
Plus		4F	Plus sign. Will be converted to a +.
Scattered	;	5E	Scattered symbol. Used to terminate individual reports within a bulletin.